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DRAWINGS ATTACHED

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(19)

(54) AN IMPROVED DEVICE FOR AERATING JETS OF WATER

(71) I, ALFONS KNAPP, of Bleicherstrasse 3, Biberach/Riss, Western Germany, a German citizen, do hereby declare the invention, for which I pray that a patent may be grant to me and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to further improvements in a device for aerating jets of water, as described in my copending U.K. Patent Application No. 34396/70 (Final No. 1282957).

According to the requirements of some applications, as well as to the rules of some countries, a device for aerating jets of water should be efficient even when the flow of water is of a reduced volume. Although the aeration device according to my U.K. Patent No. 1282957 shows, also from this point of view, favourable characteristics in comparison with the prior art constructions, nevertheless it has been found that, with reduced flow, the greatest efficiency can be reached only when the sub-divided and mutually convergent jets are substantially radial, whilst convergent jets directed obliquely relative to the flow axis show a lower efficiency with reduced flow.

The construction of a sub-divider member capable of producing radially convergent jets involves considerable technical difficulties which remarkably affect the costs concerned, more particularly if, in view of achieving efficient operation is also at high flow rates, a wide passage section is required, e.g. in the form of several radial passages which would excessively complicate the moulding of the sub-divider member. A further problem arising in the case of an aerated jet with reduced flow consists in the stability of the jet itself, which is not sufficiently assured by means commonly in use.

According to the present invention there is provided a device for aerating a flow of water, comprising a sub-divider member in which are formed passages each provided for the flow therethrough of a part of the flow to be aerated, the passages being shaped and arranged to produce mutually convergent jets intended to impact violently either mutually or on an element of the device and to atomize, and a deflecting member superimposed on said sub-divider member and closing the passages thereof except at their lower ends, whereby the produced convergent jets are directed in a substantially radial direction.

The jet stabilisation with reduced flow is obtained by means of a baffle provided with large sized passages nearly like a mesh having large meshes and fitted in the flow path after atomisation of the latter and before its delivery.

Embodiments of the present invention will now be described by way of example with reference to the accompanying drawings, in which:—

Fig. 1 shows an enlarged axial section of an aeration device;

Fig. 2 is an exploded sectional view of the parts forming the device of Fig. 1;

Fig. 3 is a front view of a flow sub-divider member;

Fig. 4 is a front view of a jet stabilising baffle;

Fig. 5 shows an axial section of the conically-shaped aeration device, including the jet stabilising baffle;

Figs. 6 to 8 show further embodiments of the jet stabilising baffle.

The device shown in Fig. 1, similarly the device shown in our U.K. Patent No. 1282957, has a body 1 intended for application to a conduit 2; further a sub-divider member comprising a disc 3, a centre post 4 and slots 5; a sleeve 7 delimiting a gap 8 communicating with the exterior air through air inlets 9 of the body 1, and a stabilizer ball 12 provided near the mouth 11 of the body 1. As said parts substantially correspond to those described in my Patent No. 1282957 their shape and operation need not be specified.

In order to make substantially radial the

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convergent sub-divided jets produced by the sub-divider member 3—5 when necessary, without complicating the construction of said sub-divider member, a deflecting member 14 is provided for superimposition on to the sub-divider member 3—5, thus allowing the water entering into the sub-divider member to do so only in a substantially radial direction. The deflecting member 14 can be internally and externally shaped as a truncated cone, but different shapes are also possible and functional. Preferably the said deflecting member shows a deflecting sharp edge 15 which greatly facilitates the atomization of the water flow. According to the embodiment illustrated said sharp edge is provided between the internal and external conical surfaces of the member 14, but it could also be provided between a cylindrical wall and a frusto-conically shaped one, or between a cylindrical or frusto-conically shaped wall and a flat one. According to the embodiment in question, the outer surface of the deflecting member 14 is made rough, namely by a number of projecting points 16, which can be easily moulded because they extend axially, and are provided for obtaining a braking effect in the immediate vicinity of the deflecting member, in order to facilitate the successive deflection and subsequent atomization of the flow. The deflecting member 14 has a central hole 17, so that the member 14 can be press fitted on a pin 18 on the sub-divider member 3—5 thus permitting an easy connection between the two parts. Opposite said pin 18, in the sub-divider member 3—5 a rod 19 is provided for connection to the stabilizer ball 12, for instance by press fitting, the ball 12 being provided with a blind hole 20. The convergent jets produced by the sub-divider member 3—5 will impact onto the rod 19, without modifying the working manner of the device. The sleeve 7 is preferably provided on its upper part with castellations forming air inlets 21, the sub-divider member 3—5 (which affect sealing with regard to the conduit 2) resting thereon.

Alternatively the rod 19 may be omitted, the sub-divider member being shaped like that of Fig. 1 of Patent No. 1282957 except for the provision of a pin 18, and in this case the jets will impact mutually instead of onto the rod 19.

A particularly efficient stabilization of the aerated jet with reduced flow can be obtained by letting the jet pass through a baffle substantially structured like a large mesh. By way of example, said baffle can have the design shown in the embodiment illustrated in Figs. 4 or 5, in which the baffle 22 comprises radial elements, some portions projecting therefrom in such a way as to define a plurality of braking passages for the jet. According to this embodiment the wide free passage section does not noticeably hinder the jet, not even when the flow is great. As shown in Figs. 4 and 5, the baffle 22 is formed in one piece when moulding a body 1' for the device (the body and baffle shown in Figs. 4 and 5 being different embodiment from that shown in Fig. 1). Said baffle could be formed in one piece with the ball 12' (Fig. 6) instead of being carried out in the form of radial projections; alternatively it could be formed in one piece with the sleeve 7' (Fig. 7). Advantageously, according to Fig. 8, the baffle 22'' forms a part of a lower portion 23 of the sleeve 7, so that it will be located close to the mouth 11 of the body 1 after assembling the sleeve (the position being shown by the dotted lines in Fig. 1). It will be seen that the sub-divider member 3—5 has a shape such as to produce only a low resistance to the flow and thus a low counter-pressure in the pipes upstream of the device; on the contrary the deflecting member includes a noticeable counter-pressure in the pipes upstream, thus reducing noise. Accordingly, the form of the aerating device described herein is particularly suitable when noice reduction is required, whilst it is generally not suitable when any counter-pressure is to be avoided, for example by using the aerator in combination with a gas water heater.

When a deflecting member 14 is superimposed on the subdivider member 3—5, this member 14 substantially assumes the function of supporting the deflecting member. Accordingly, its conformation can be noticeably modified without varying the operation of the device.

Of course, also the further parts of the device can be variously modified as to their shape, proportions and arrangement, without departing from the scope of this invention.

According to the embodiments described above the device is made of two separate portions produced by frontal moulding i.e. in an economical way from the industrial standpoint. The first portion or sub-divider member of the device is capable of operating like the device already referred to in my Patent No. 1282957. The second portion of the device or a flow deflecting member, intended to match with the first portion, may be used for raising the efficiency of the aeration by reduced flow; whilst use of the first sub-divider portion only remains possible, should the requirement above not arise, thus allowing a constructive standardization of aerators having different functional properties.

WHAT I CLAIM IS:—

1. A device for aerating a flow of water, comprising a sub-divider member in which

are formed passages each provided for the flow therethrough of a part of the flow to be aerated, the passages being shaped and arranged to produce mutually convergent jets intended to impact violently either mutually or on an element of the device, and to atomize, and a deflecting member superimposed on said sub-divider member and closing the passages thereof except at their lower ends, whereby the produced convergent jets are directed in a substantially radial direction.

2. A device according to claim 1, in which said deflecting member has a substantially sharp deflecting edge.

3. A device according to claim 1, in which said deflecting member has a substantially frusto-conical shape.

4. A device according to claim 3, in which the outer surface of said deflecting member has several points forming a roughness for slowing down the flow in their vicinity.

5. A device as set forth in claim 1, in which said deflecting member has a central hole, and the sub-divider member has a central pin for receiving the hole of the deflecting member for connection purpose.

6. A device according to claim 1, of the type having a jet stabilizer in the form of a ball, in which the flow sub-divider member has an axial shaft intended for supporting said jet stabilizer.

7. A device according to any of the preceding claims, comprising a jet stabilizer having substantially the shape of an apertured baffle inserted in the way of the aerated jet.

8. A device according to claim 7, in which said baffle is integral with the body of the device.

9. A device according to claim 7, in which said baffle is integral with the stabilizer member.

10. A device according to claim 7, in which said baffle is integral with the sleeve defining the gap for the introduction of air into the jet.

11. A device according to claim 10, in which said baffle is integral with a lower projection of the sleeve whereby, in the assembled device, said baffle is arranged near the mouth of the body.

12. A device according to any of the preceding claims, in which the sleeve defining the gap for introduction of air has at its upper end castellations for air passage, and it provides support for the sub-divider member which further acts as a packing against the water supply conduit.

13. A device for aerating a jet of water, substantially as hereinbefore described with reference to Figs. 1 to 3 or Fig. 4 and 5 or any one of Figs. 6 to 8 of the accompanying drawings.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

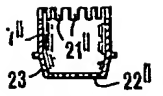

FIG. 8

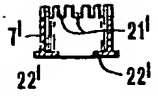

FIG. 7

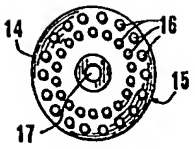

FIG. 3

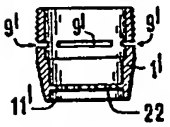

FIG. 5

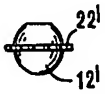

FIG. 6

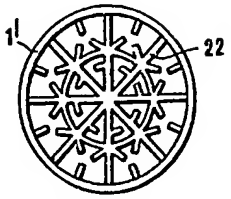

FIG. 4

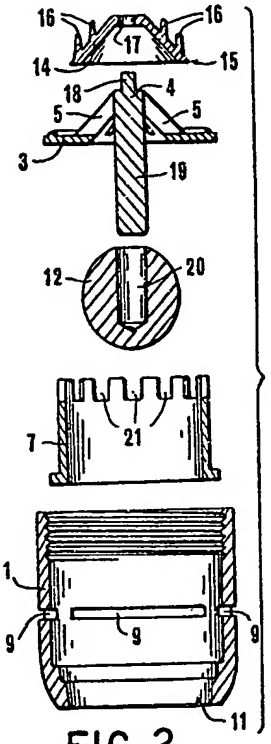

FIG. 2

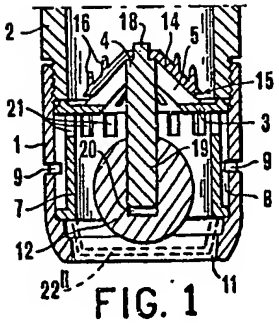

FIG. 1